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THE INDO-AUSTRALIAN SPECIES OF THE ANT GENUS *STRUMIGENYS* FR. SMITH: *S. WALLACEI* EMERY AND RELATIVES[1]

By William L. Brown, Jr.
Museum of Comparative Zoology, Harvard University

This is another part of my continuing revision of the dacetine ant genus *Strumigenys*. Here are discussed three species of the *szalayi* group, one of which is described as new. The other species of the group will be treated in a later paper in the series. The abbreviations for measurements and proportions are explained in previous parts of the revision: see Psyche 60: 1 (1953). Deposition of certain types is indicated by capitals in brackets as follows: United States National Museum [USNM], Museum of Comparative Zoology, Harvard University [MCZ].

Strumigenys nidifex Mann

Strumigenys nidifex Mann, 1921, Bull. Mus. Comp. Zool. Harvard, *64*: 464, fig. 23, all castes.

This very large, dark brown species is found only on a few of the larger islands of the Fijian Group. The original description permits easy recognition; the ant is larger than any other species known from the Indo-Australian area, although Mann's measurements are a bit too low. I have recently received specimens from Mr. N. L. H. Krauss taken at Navai, Viti Levu. It nests under stones, where it builds reticulately patterned nests with mud, or in rotten wood [USNM, MCZ].

Strumigenys wallacei Emery

Strumigenys Wallacei Emery, 1897, Term. Füzetek *20*: 575, 578, pl. 14, fig. 7, worker.

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[1] Published with a grant from the Museum of Comparative Zoology at Harvard College.

I have seen no specimens of this species, but Emery's figure and description show that it is very closely related to *S. opaca* sp. nov., described below. Emery's measurements are probably too low ("2¾-3 mm."), and in his figure, the eyes may be portrayed as much too flat, judging from other related species. In the width of the head, form and pilosity of the antennal scapes, and other features, this species and *S. opaca* together form a subgroup distinct from the other *szalayi* relatives. Possibly *wallacei*, like *opaca*, may also lack the intercalary tooth of the apical fork. Of *wallacei*, Emery says the gaster is "nitida, nigra, basi rugosi-striata." In the new species, the entire first tergite is sculptured and opaque, and is deep red instead of black. As already mentioned, the difference in the eyes as portrayed in Emery's figure may not be reliable, so we shall have to await an opportunity to see types of *wallacei* before citing other distinctions between the two species. The types are either in the Emery Collection, Museo Civico di Storia Naturale, Genoa, or in the Hungarian National Museum, Budapest, or both. Type locality: Lemien Forest, near Berlinhafen, New Guinea.

Strumigenys opaca new species

Holotype worker: TL 3.49 mm., HL 0.83 mm., ML 0.46 mm., WL 0.81 mm.; CI 86, MI 55. Occipital lobes overlapping pronotum by about 0.04 m., this amount not subtracted from TL.

Head in outline very much as in Emery's figure of *S. wallacei* (see above), very broad and similarly deeply excised posteriorly. Eyes larger, more convex and more strongly protuberant, also more anteriorly directed, than those shown for *wallacei* in Emery's figure. Actually, the eyes are situated on low protuberances, immediately in front of which run deep vertical preocular sulci; the latter continue onto the ventral surface of the head and join there to form the deep postoral sulcus. Antennal scrobes ending abruptly above the eyes. As the head is seen in direct dorsal view, the dorsolateral borders run well inside of the ventrolateral borders and are only very feebly indented at the level of the eyes. The periocular structure is similar to that of *szalayi*, *nidifex*, etc., but differs in having the dorsolateral borders only slightly indented above the eyes and in having the eyes themselves much larger and more protruding, more nearly prospicient.

Vertex evenly convex, feebly impressed in the middle; occipital lobes strongly depressed and nearly plane dorsally; broadly expanded both posteriad and laterad. Clypeus more than half again as broad as long, moderately convex, anterior border emarginate and weakly depressed in the middle.

Mandibles about as shown in Emery's *wallacei* figure, slightly depressed and very slightly broadened just at their insertions. Seen from the side, they tilt slightly dorsad and are feebly arched. Apical fork of two long spiniform teeth, subparallel and forming a U, the ventral tooth (L 0.10 mm.) about ⅔ as long as the dorsal (L 0.15-0.16 mm.); no intercalary denticle. Preapical tooth slightly curved, spiniform, situated at approximately the apical third of the ML, its L ca. 0.10 mm.

Antennal scapes (straightline L about 0.60 mm.) very feebly bent posteriorly near the base, where they are very slender; apical half gradually incrassate, thickest at about the apical quarter, and gently arched so as to follow the contour of the sides of the head when in repose. This adaptation evidently compensates for the incomplete condition of the scrobes, and is seen in somewhat similar form in *szalayi*. Funiculus L 0.65 mm., the apical segment occupying just half this length; IV longer than I; II and III subequal, longer than broad, together not quite as long as I.

Anterior promesonotum gently convex, descending behind through the evenly concave posterior half of the mesonotum to the lower, extremely feebly convex (nearly straight in profile) propodeal dorsum; metanotal groove obsolete. Promesonotum seen from above with a very narrowly rounded and poorly developed anterior border; cervix with a median dorsal carinula. No traces of humeral angles or tubercles, humeral region gently convex, promesonotal suture obsolete. Propodeal teeth long (L ca. 0.12 mm.), set far apart, slender, acute, feebly diverging and elevated at an angle of about 35° from the plane of the propodeal dorsum. Infradental carinulae indistinct, becoming obsolete ventrad.

Petiolar peduncle slender, slightly longer than node. Node evenly rounded above, very slightly broader than long, with only very narrow, sublamellose vestiges of appendages posterodorsally, posterolaterally and ventrally. Postpetiole twice as broad as petiolar node, and higher and more bulky, subglobose, only slightly broader than long (L 0.20, W 0.25 mm.); spongiform appendages poorly developed, restricted to thin posterodorsal border and meager ventral and ventrolateral lobes.

Entire insect, except for shining mandibular apices, densely and finely sculptured and opaque; the sculpture predominantly punctulate as in other species of the genus, and similarly becoming more superficial and indistinct on the gastric dorsum, which, though largely quite opaque, becomes less definitely so toward the apex.

Dorsum of head, alitrunk and nodes with a sparse, inconspicuous ground pilosity of short, spatulate subappressed hairs. Clypeus with a medially directed fringe of spatulate hairs, about 9 or 10 on each side of the middle. Anterior border of scape with a regular row of stiff, apically-inclined oar-shaped hairs, becoming longer toward the scape apex; a similar row appears in Emery's figure of *wallacei*, but the individual hairs in *opaca* appear to have broader blades apically. Hairs on inner mandibular borders near base long, fine, subreclinate; those near apex longer, perpendicular. Abundant short subreclinate hairs along posterior borders of scapes. No specialized erect hairs on head or alitrunk. Short, erect, posteriorly-inclined clavo-spatulate hairs as follows: a pair on postpetiole; 3 pairs on basal gastric tergite; transverse rows of 4-6 hairs each on succeeding gastric segments, becoming smaller and finer toward extreme apex. Short fine hairs under gastric apex.

Color deep brownish-red; mandibles, legs, antennae and occipital lobes a trifle lighter and more yellowish.

Holotype [MCZ] selected from a nest series of 15 workers taken in rain-forest at Lankelly Creek in the McIlwraith Range, a few miles east of Coen, central Cape York Peninsula, Queensland during June, 1932 (P. J. Darlington: Harvard Australia Expedition).

Paratypes: [MCZ, USNM, Queensland Museum, etc.] the remaining 14 workers from the type nest series are very uniform in structure and color, and quantitative variation is slight. TL 3.18-3.51, HL 0.78-0.85, ML 0.43-0.48, WL 0.75-0.81 mm.; CI 82-86, MI 54-57.

FIRST RECORDS OF THE EUROPEAN MANTIS RELIGIOSA (L.) FROM MAINE. — Aside from the persistent records from New York and Ontario, the last three years have produced numerous records of this insect in widely scattered localities in Vermont, Massachusetts, and Connecticut. Although only one specimen was reported in Sept. 1951, from Saco, Maine (Mrs. G. B. Nutting), the following 1952 records from York County, Maine indicate that it may now have a hold in that state: three specimens from Biddeford, 15, 18 Aug., and 6 Oct. (H. J. Edwards, A. Lowell, and J. Foran); one specimen from South Buxton, 10 Sept. (determined by Mr. A. E. Brower of the Entomological Laboratory, Augusta). The Biddeford records, along with numerous other "sightings", were largely from the business district, in yards, on window sills, parking meters, and the like. Although the males fly well, as do many females before they become gravid, this relatively rapid spread is probably due largely to long-distance shipments of hay and nursery stock containing their egg masses.

The average winter temperature of coastal and southeastern Maine is close to that of southern Ontario, but is definitely warmer than northeastern Ontario near the confluence of the Ottawa and St. Lawrence Rivers. Since this mantid is already well established in both these regions of Ontario, it is possible that it may eventually become a permanent resident over much of New England, including coastal Maine. — W. L. NUTTING, Biological Laboratories, Harvard University.

AUSTRALIAN CARABID BEETLES II. SOME NEW PTEROSTICHINI

By P. J. Darlington, Jr.
Museum of Comparative Zoology, Harvard University

This is the second of what I hope will be a continuing series of papers on Australian Carabidae. The first, with some information on sources of material and methods of work, appeared in *Psyche*, vol. 60, 1953, pp. 52-61. The present paper contains the descriptions of seven new Pterostichini of the Australian genera *Leiradira, Setalis, Trichosternus,* and *Notonomus*. Several of the new species either extend the known ranges of their genera or show unusual characters or variations. Except as otherwise stated, all the specimens here reported upon were collected by myself during the course of the Harvard Australian Expedition of 1931-1932.

Genus *Leiradira* Cast.

Leiradira alternans n. sp.

Of general form and appearance of previously known *Leiradira* (*e. g. auricollis* Cast.) but larger and narrower; color, including appendages, black or piceous (more rufous in recently emerged individuals) with outer antennal segments brown; rather shining, microsculpture faint, isodiametric on head, somewhat transverse on prothorax and elytra. *Head* normal for genus, .67 and .71 width prothorax in ♂ ♀ measured; antennae geniculate but with 1st segment shorter than usual in genus; frontal sulci deep, linear, somewhat curved and converging anteriorly, joined anteriorly by a variable but usually lightly impressed clypeal suture; surface impunctate. *Prothorax* appearing at least as long as wide but by measurement slightly wider than long; base about equal to apex; sides broadly arcuate, almost parallel 1/3 from apex, strongly sinuate just before base; basal angles right; lateral margins very narrow, consisting of marginal bead only, with usual setae at base and about 1/3 from apex; base subtruncate or slightly sinuate; apex subtruncate, with anterior angles very slightly advanced; sub-basal impressions in form of deep, somewhat elongate foveae, each connected with the margin posteriorly by a deep, curved impression; disc with median line light, transverse impressions obsolete, surface impunctate. *Elytra* 1/5 or 1/4 wider than prothorax, not or moderately narrowed anteriorly (variable), with sides subparallel or slightly arcuate at middle, sinuate before apex, then rather narrowly and almost conjointly rounded; basal margin either entire and conspicuously lobed or interrupted at 1st, 3rd, and 5th intervals (variation individual, not geographical), approximately rectangular and strongly elevated at humeri; striae rather deep, entire, impunctate, but finely granular at bottom; intervals alternately wide and narrow (1, 3, 5, and 7 wide), moderately convex on disc, more so laterally and apically; 3rd interval 2, 3, or 4 punctate, the punctures somewhat irregular in position as well as number; 8th and 9th intervals narrow and convex; fragments of a very narrow 10th (submarginal) interval posteriorly. Prosternal process not margined, declivity flat, without setae; metepisterna short; sides of sterna not much punctate, but sides of abdomen especially anteriorly extensively punctate, with the segments more or less impressed near sides. Fifth segment of tarsi without accessory setae below. Male with anterior tarsi a little dilated, first 3 segments biseriately squamulose; ♂ with 1, ♀ with 2 setigerous punctures each side last ventral segment. Length 14-16.5; width 4.1-5.0 mm.

Holotype ♂ (M. C. Z. Type No. 29,016) and 3 paratypes from Malanda, Atherton Tableland, North Queensland, Nov. 7 and 8, 1950, collected by Dr. W. L. Brown in rotten logs in rain forest; and also the following additional paratypes: 3, Millaa Millaa, Atherton Tableland, about 2,500 ft. altitude, April, 1932; and 1, Lake Barrine, Atherton Tableland, about 2,300 ft. altitude, April, 1932.

This, the first *Leiradira* to be recorded from North Queensland, is very distinct from all species previously assigned to the genus. The alternation in width of the elytral intervals is alone enough to distinguish it from, for example, *L. auricollis* Cast. and all other known species of the genus (keyed out and discussed by Tschitscherine in *Horae Soc. Ent. Rossicae,* Vol. 32, 1898, pp. 39-46), and there are many other specific differences. It is not so easy to say just how the new species is related to "*Notonomus*" *opacistriatus* Sl., which Sloane eventually decided was not a Notonomus (*Proc. Linn. Soc. New South Wales,* Vol. 38, 1913, p. 409), and which is from Cairns, below the Atherton Tableland. The two species are apparently related, but different. As compared with the description of *opacistriatus,* the present new species agrees in many significant details including alternation in width of the elytral intervals and opacity of the elytral striae, but Sloane's species is evidently a wider, less convex, somewhat differently shaped insect. This is shown by the measurements he gives (16 by 5.5 mm. — a 16 mm. specimen of the present new species would be less than 5 mm. wide), by his statement that his species is oval and rather depressed while the present new species is subparallel and rather convex, and by his statement that in his species the prothoracic margins (as distinguished from the lateral channels) are narrow but wider toward the base while the present new species has no margins except the lateral channels, this being consistent with the new species being a narrower and more convex insect. I think that "*Notonomus*" *opacistriatus* Sl. will probably prove to be a link between *Leiradira* and more normally formed pterostichines, but I do not care to place it formally without seeing it.

Genus *Setalis* Cast.

Setalis sloanei n. sp.

Almost exactly like *Setalis niger* Cast. in form and appearance, but very much smaller; shining black, legs brownish piceous, antennae reddish brown; upper surface slightly silky but without distinct microsculpture. *Head* .62 and .59 width prothorax in ♂ ♀ measured, almost as in *S. niger,* swollen posteriorly, with small but even more abruptly prominent eyes; frontal impressions deep, irregular, somewhat converging, joined anteriorly by a sharply defined slightly emarginate clypeal suture; surface impunctate. *Prothorax* 1/4 wider than long, narrowed anteriorly, scarcely so posteriorly; base about 2/5 wider than apex; sides broadly arcuate anteriorly, straight or even faintly sinuate and only slightly converging posteriorly; basal angles almost right but narrowly rounded; base broadly sinuate; apex subtruncate or very broadly emarginate, with anterior angles not advanced; lateral margins very narrow, with usual setae at base and about 1/4 from apex; disc normally convex; sub-basal impressions short, deep, linear, irregular or subpunctate; a group of punctures (sometimes only 1 puncture) between sub-basal impression and lateral margin; disc otherwise impunctate, with median line light, transverse impressions vague; base not distinctly margined, apex margined at sides but not at middle. *Elytra* about 1/6 wider than prothorax; sides subparallel, slightly sinuate before apex, then conjointly rounded; basal margin entire, bent forward and forming acute angles (more acute than in *niger*) at humeri; striae entire, deep, impunctate; intervals slightly convex on disc, more so laterally and apically; dorsal intervals equal, 3rd impunctate; 6th interval a little narrower especially at extremities; 7th still narrower and abbreviated posteriorly (ending near apical 1/4); 8th very narrow and a little more abbreviated (but not so short as in *niger*); 9th with usual ocellate setigerous punctures; a vague 10th interval present but not sharply separated from marginal trough. Prosternal process strongly margined (not so in *niger*), without setae; metepisterna short, they and sides of anterior ventral segments more or less punctate, but body below almost impunctate; last 3 ventral segments deeply transversely sulcate basally. Male with anterior tarsi moderately dilated, first 3 segments biseriately squamulose; last ventral segment of both sexes with 1 conspicuous puncture (sometimes doubled) each side of middle. Length 6-7; width 2.4-2.8 mm.

Holotype ♂ (M. C. Z. Type No. 29,015) and 10 paratypes all from National Park, McPherson Range, South Queensland (on New South Wales border), 3,000-4,000 ft. altitude, March, 1932.

In appearance this new species is a diminutive of *Setalis niger* Cast., but the size difference is great (*niger* is 10-12 mm. long), and there are some definite structural differences: the new species has more acute humeri, less abbreviated eighth elytral intervals, and a strongly margined prosternal process. (The M. C. Z. possesses a good series of *niger* from several localities in northern New South Wales and southern Queensland.) The new species very much resembles certain *Setalimorphus*, especially *S. regularis* Sl. (which we have), but differs in the unusual modification of the seventh and eighth elytral intervals.

Genus *Trichosternus* Chd.

Trichosternus relictus n. sp.

Rather elongate in genus, subparallel, normally convex; piceous black with purplish reflections especially on head, pronotum, and elytral margins (sometimes brassy on head and pronotum); legs piceous; antennae with 3 basal segments piceous, other segments pubescent and progressively paler brown; head and pronotum shining, with microsculpture fine and lightly impressed (nearly isodiametric on head, somewhat transverse on pronotum); elytra (except margins) duller, with microsculpture fine but deeply impressed, isodiametric; but marginal trough of elytra shining, with microsculpture faint; whole insect virtually impunctate above and below, except for punctures of fixed setae. *Head* large, .77 and .85 width prothorax in ♂ ♀ measured, but appearing wider; mandibles rather short; eyes small but convex, slightly more prominent than genae; genae barely longer than eyes, convex in profile; 2 setae above each eye; frontal impressions parallel, not deep, rather irregular; mentum deeply emarginate, with tooth rather broad, short, channeled; labium bisetose; paraglossae glabrous; inner lobe of maxilla strongly curved in at apex, with inner margin densely ciliate. *Prothorax* nearly 1/3 (width/length 1.33 and 1.31 in ♂ ♀ measured) wider than long, widest about 1/3 from apex; base slightly narrower than apex; sides only moderately arcuate anteriorly, slightly arcuate or straight or at most faintly sinuate posteriorly; basal angles narrowly rounded, obtuse; base broadly and shallowly emarginate; apex scarcely emarginate, with anterior angles slightly advanced; lateral margins rather narrow anteriorly, a little wider posteriorly, each with a seta near (just before) base and at about apical 1/3; baso-lateral impressions irregularly rounded, each with whole bottom occupied by a low tubercle; disc normally convex, with usual middle line and transverse impressions; base and apex margined at sides but not at middle. *Elytra* subparallel, only slightly narrowed anteriorly, rather long (in genus), only about 1/5 or less wider than prothorax (appearing scarcely wider); basal margin entire, strongly (almost rectangularly) angulate at humeri but not distinctly dentate; sides almost straight, then increasingly arcuate, without distinct subapical sinuations, to right or slightly obtuse sutural angles; striae well impressed, punctate; intervals all rather strongly and almost equally convex, 3rd with single setigerous puncture very near apex, 5th with 2 punctures, set respectively well forward (about as far from base as from suture) and well back (punctures somewhat variable in position and single punctures sometimes absent). Prosternal declivity and apex of mesosternum setose; last ventral segment 4-setose (2 setae each side) in both sexes. Male with anterior tarsi normally dilated, first 3 segments biseriately squamulose. Length 23-28; width about 7.4-8.3 mm.

Holotype ♂ (M. C. Z. Type No. 29,010) and 19 paratypes all from near the town of Margaret River, southwestern division of Western Australia, October, 1931, taken under logs on the ground in eucalyptus woods.

This is the first species of the whole *Trichosternus* complex to be found in Western Australia. It is a very distinct species, and I am unwilling to assign it to any recognized subgenus of the genus, much less to say to what other species it is most closely related. Superficially it is something like *T.* (*Castelnaudia*) *speciosus* Sl., but is more parallel-sided, with sides of prothorax not or at most faintly sinuate, and with elytral intervals all about equally convex.

Trichosternus soror n. sp.

Form average in genus, small, rather convex; piceous black, upper surface purplish, color brightest on head and pronotum; legs piceous; antennae with 3 basal segments reddish piceous, outer ones browner; head and pronotum shining, with microsculpture fine, light, about isodiametric on head, slightly transverse on pronotum; elytra duller but still somewhat shining especially on tops of subcostate intervals, with more deeply impressed, fine, isodiametric microsculpture; sides of elytra (8th intervals) dull, with almost granular microsculpture. *Head* 4/5 (.79 and .81) width prothorax but appearing wider; mandibles moderately long; eyes small but convex, scarcely more prominent than genae; genae slightly shorter than eyes, convex in profile; 2 setae over each eye; frontal impressions parallel, not deep, irregular; mentum tooth bifid. *Prothorax* subcordate, about 1/5 or 1/4 wider than long (width/length 1.20 and 1.27), widest about 1/3 from apex; base a little (about 1/10) narrower than apex; sides moderately arcuate anteriorly, then straight and converging posteriorly, then moderately sinuate before almost-right posterior angles; base scarcely emarginate at middle, slightly oblique at sides; apex very broadly and slightly emarginate, with anterior angles slightly advanced; lateral margins rather narrow anteriorly, very narrow posteriorly, each with a seta at basal angle and another about 1/3 from apex; baso-lateral impressions normal, sub-linear, somewhat wrinkled but not distinctly punctate; disc normal; basal area longitudinally, irregularly striate; base and apex not distinctly margined except near sides. *Elytra* suboval, narrowed anteriorly, a little more convex than usual in genus, 1/4 to 1/3 wider than prothorax; basal margin entire, almost rectangularly angulate and subdentate at humeri; sides broadly rounded; subapical sinuations almost absent; sutural angles nearly right but slightly blunted; striae fine, defined mostly by slope of intervals, rather finely punctate; intervals 1 to 7 strongly convex, subcostate, almost equal in height except 7th higher and costiform basally; 8th interval about same width but only slightly convex and very dull; 9th (submarginal) interval narrow and shining; each 3rd interval with 3 setigerous punctures spaced in posterior half (none anteriorly). Prosternal process and mesosternal declivity setose; sides of metasternum (not episterna) with a few coarse punctures but body below otherwise virtually impunctate. Male with front tarsi not dilated and with no sexual pubescence; last ventral segment of male with 1 strong setigerous puncture each side and several smaller ones in from margin near middle, of female with 2 setigerous punctures on one side and three on other. Length about 21; width about 6.7 mm.

Holotype ♂ (M. C. Z. Type No. 29,011) and 1 ♀ paratype both from Millaa Millaa,, Atherton Tableland, North Queensland, about 2,500 ft. altitude, April, 1932, in "scrub" (rain forest).

The unmodified front tarsi of the male set this species apart from most others of the genus. Otherwise the new species somewhat resembles *T.* (*Castelnaudia*) *nitidicollis* Cast. and its allies (of South Queensland etc.), but differs in having the discal elytral intervals (1 to 6) almost equally elevated instead of alternately so, and it differs also in various minor characters. Unmodified male tarsi occur in *T. subvirens* Chd. and *T. simplicipes* Sl. (of South Queensland) but in these species the mentum tooth is rounded, not bifid as in the present new species, and there are many other specific differences. For these reasons I doubt if the new species is very closely related to any previously known one. This species is, of course, very small within its genus.

Genus *Notonomus* Chd.

The following three new species of *Notonomus* go with *N. doddi* Sl. and *saepestriatus* Sl. (both known to me only by description) to form a subgroup of the "*kingi*-group" of Sloane's second revision of the genus (Proc. Linn. Soc. New South Wales, Vol. 38, 1913, pp. 404-449, esp. pp. 437-440). The subgroup is apparently confined to North Queensland (known from the Atherton Tableland and Mt. Spurgeon) and is characterized by having the posterior-lateral setigerous puncture of the margin of the pronotum on the margin at the basal angle; the elytra fully and strongly striate, with the third interval not more than (but sometimes less than) 2-punctate and the fifth and seventh intervals impunctate, and the eighth interval (the tenth in the species with extra intervals) narrow and convex; the metepisterna short; the intercoxal declivity of the prosternum flat and without setae; the tarsi not striate above; the posterior tarsi with the first segment rather long (but not quite so long as the next two together), with the claw-segment glabrous below; and with secondary sexual characters normal, that is the male with one seta on each side of the last ventral segment and the female with two setae each side, and the male with the anterior tarsi moderately dilated and with the first three segments biseriately squamulose below and the female usually with these tarsi unmodified — but see under *N. masculinus,* below. The species of this subgroup differ remarkably among themselves in some other characters, as the following key shows. Incidentally, Mt. Spurgeon is probably the most northern locality at which any *Notonomus* has been found.

Key to the species of *Notonomus* of the *doddi* subgroup

1. Elytron with 9 normal intervals plus a narrow 10th submarginal one which does not reach base . . . 2
– Elytron with 11 intervals plus the narrow submarginal one (7th interval triplicate) 4

2. Head and pronotum shining; elytral intervals not catenulate . . . . *spurgeoni* n. sp.
– Head and prothorax dull; elytral intervals catenulate 3

3. Pronotum transversely striolate; elytron with 3rd interval 2-punctate . . . . *doddi* Sl.
– Pronotum longitudinally striolate; elytron with 3rd interval impunctate . . . . *masculinus* n. sp.

4. Pronotum shining; elytral intervals not much catenulate (only 2nd interval crenulate on apical declivity) . . *saepistriatus* Sl.
– Pronotum dull; elytral intervals more extensively subcatenulate . . . . *triplicatus* n. sp.

Notonomus spurgeoni n. sp.

With characters of *doddi* subgroup (above) ; a little more slender than usual but otherwise of about average form and convexity for genus; purple or purplish above, piceous below, with appendages piceous to brownish-piceous; rather shining; microsculpture fine and light (heavier on elytra), isodiametric in head and elytra, perhaps slightly transverse (but faint) on pronotum. *Head* normal for genus, .70 and .67 width prothorax in ♂ ♀ measured. *Prothorax* a little wider than long (width/length 1.12 and 1.20 in ♂ ♀ measured) but appearing as long as wide; base about 1/10 wider than apex; sides broadly and rather weakly arcuate for most of length, then straight or faintly sinuate near base;

posterior angles rather variable, slightly obtuse or right, more or less denticulate; base slightly sinuate; apex slightly and broadly emarginate, the anterior angles scarcely advanced beyond the line of the emargination, narrowly rounded; lateral margins very narrow, scarcely wider toward base; baso-lateral impressions normal, linear, impunctate, reaching base; middle line distinct, transverse impressions sub-obsolete; disc impunctate, with lightly impressed transverse wrinkles; basal and apical marginal lines widely interrupted at middle. *Elytra* subparallel, not or slightly narrowed anteriorly, not much wider than prothorax (1.13 and 1.17 as wide in measured ♂ ♀); basal margin entire; strongly (almost acutely) angulate and subdentate at humeri; striae deep, impunctate; intervals convex, not catenulate (except extreme lateral ones), 3rd 2-punctate, the punctures near middle of length and behind apical 1/4. Length 13.5-18.0; width 4.0-5.3 mm.

Holotype ♂ (M. C. Z. Type No. 29,012) and 16 paratypes all from Mt. Spurgeon, North Queensland, 3,500-4,000 ft. altitude, July, 1932, in "scrub" (rain forest).

This new species is sufficiently compared with others in the key, above.

Notonomus masculinus n. sp.

With characters of *doddi* subgroup (above); a little broader than usual but otherwise of about average form for genus; black, faintly purplish above, greenish at middle of pronotum, appendages black to piceous; head and pronotum dull, elytral intervals more shining; reticulate microsculpture very fine and isodiametric on head and elytra, replaced by close longitudinal strigae on pronotum. *Head* normal, not large, .66 and .65 width prothorax in ♂ ♀ measured. *Prothorax* 1/4 to 1/3 wider than long; base 1/5 or less wider than apex; sides moderately arcuate, then straight and converging to obtuse but denticulate posterior angles; base slightly sinuate; apex broadly emarginate, with anterior angles not advanced beyond line of emargination, narrowly rounded; lateral margins very narrow; baso-lateral impressions linear; disc almost flat, impunctate, with middle line distinct but transverse impressions obsolete; base and apex not margined at middle. *Elytra* rather broad, about 1/5 wider than prothorax; not much narrowed anteriorly; sides very broadly arcuate; anterior margin entire, about rectangular and at most finely dentate at humeri; striae deep, not visibly punctate; intervals convex, strongly catenulate, 3rd impunctate (in all specimens). Secondary sexual characters of ♂ normal, but ♀ with anterior tarsi, though not much dilated, with first segment conspicuously biseriately squamulose below. Length about 17.5-20.5; width 5.4-6.6 mm.

Holotype ♂ (M. C. Z. Type No. 29,013) and 4 ♂ 1 ♀ paratypes all from Millaa Millaa, Atherton Tableland, North Queensland, about 2,500 ft. altitude, April, 1932. Also 2 specimens (♂ ♀), not types, from Herberton, Atherton Tableland, July, 1951, collected by and received from Dr. J. G. Brooks.

This species too is sufficiently compared with others in the key, above. The carrying over into the female sex of a part of the clothing of the male front tarsus is unique among Carabidae, so far as I know. Since the squamules are conspicuously present on the first segment of both front tarsi of two females from different localities, I suppose that this is a specific character and not an individual abnormality.

Notonomus triplicatus n. sp.

With characters of *doddi* subgroup (above); form about average for genus; piceous, dull bronze above, appendages piceous to brown; entire upper surface rather dull, with fine, well impressed, isodiametric microsculpture. *Head* normal, not large, .65 and .63 width prothorax in ♂ ♀ measured. *Prothorax* 1/4 to 1/3 wider than long; base about 1/5 or less wider than apex; sides moderately arcuate for most of length, nearly straight and converging near base; posterior angles obtuse but subdenticulate; base slightly sinuate; apex broadly emarginate, with anterior angles not advanced beyond line of curve of emargination, narrowly rounded; lateral margins narrow only slightly wider basally; baso-lateral impressions linear; disc only slightly convex, impunctate, with middle line distinct but transverse impressions indistinct; base and apex not margined at middle. *Elytra* moderately broad, subparallel, not much narrowed anteriorly, about 1/8 or 1 7 wider than prothorax; anterior margin entire, rectangular and subdentate at humeri; striae deep; intervals convex, subcatenate or catenate especially posteriorly, 7th tripled, 3rd with 2 setigerous punctures, near middle of length and behind posterior 1/4. Length about 18; width about 5.6 mm.

Holotype ♂ (M. C. Z. Type No. 29,014) and 3 paratypes (♂ ♀ ♀) all from Lake Barrine (type) and the nearby town of Yungaburra, Atherton Tableland, about 2,300 ft. altitude, April, 1932.

Like the preceding ones, this new species is sufficiently compared with previously known species in the key, above. In many ways it is much like the preceding new species (*masculinus*), but it differs strikingly in the tripling of the seventh interval and in microsculpture, and the female has normal, unmodified front tarsi.

TAXONOMIC NOTES ON THE ANT, *CAMPONOTUS COOPERI* GREGG

By Robert E. Gregg

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Several years ago I described an unusual Central American ant, naming it *cooperi* and placing it in the genus *Camponotus* (Gregg, 1951). The specimen, a single alate female, was sent to me by Dr. W. L. Brown, for description and illustration, together with some comments on its affinities. Since the facies of the ant is astonishingly like those of *Camponotus,* and particularly because of its close similarity to members of the subgenus *Myrmostenus,* both of us concluded it belonged to these groups. It was accordingly placed in the genus *Camponotus* and as a new species in the above subgenus which Emery had erected in 1920 to contain several South American species previously described by him. Unfortunately, all of these ants are known only from the female caste, no workers having as yet been found (Emery, 1925).

Recently, Dr. Brown checked the type of *cooperi,* and it now develops that the ant cannot possibly be considered a form of *Camponotus* owing to the fact that the antennae are 10-segmented instead of having 12 articles characteristic of the above named genus. The description and figure also give 10 as the antennal joint number, so the mistake obviously lies in our interpretation of the relationships of *cooperi*. The slip is attributable to the amazing similarities in habitus (except smaller size) between the new ant and those in the subgenus *Myrmostenus,* which resemblances are probably to be regarded as the products of convergent evolution.

Dr. Brown has offered the following statement (in litt.) with respect to his current view on the matter. "Although the proventriculus has not been dissected out for examination, it appears very probable that this species [*cooperi*] really belongs in the vicinity of *Myrmelachista,* particularly of the subgenus *Decamera* Roger. The species described by Menozzi (1935) as *Aphomomyrmex* (*Neaphomus*) *goetschi* from Chile also falls close into this group, according to his characterization and Wheeler's key of 1922. The genera of the tribe Myrmelachistini appear to be in confusion, partly due to the unsatisfactory nature of the antennal club as a stable group character. A female of *Myrmelachista* (*Decamera*) *paderewskii* Forel in the Museum of Comparative Zoology is almost as large as the *cooperi* female, but is much less aberrant in many ways. At present it appears best to consider Menozzi's *goetschi,* with *cooperi,* as members of an independent genus bearing the name *Neaphomus* Menozzi."

There is no doubt that *cooperi* must be removed from *Camponotus* and placed in another, and more appropriate, genus, and it seems advisable to do so without involving any new generic names at this time, even though the group chosen may be shown subsequently to be an artificial assemblage. However, I do not concur with Dr. Brown's treatment quoted above, which would produce certain nomenclatural changes, but feel that in view of the unsatisfactory nature of the classification of the various species concerned, it is much safer to make as few shifts as possible, and to place the ant in question in the genus *Aphomomyrmex* into which group it falls with no difficulty according to Wheeler's key to the genera written in 1922. Wheeler expressly states that the females of this genus have 10-segmented antennae, and since no workers accompanied the specimen of *cooperi,* it is impossible to state what their antennal condition may be and we are forced to rely entirely upon the segment number of the female. Furthermore, while the genus *Myrmelachista* (subgenus *Decamera*) possesses 10-jointed antennae, the genus as a whole has a differentiated club, which is absent from the *cooperi* female, the joints of same showing a gradual increase in thickness toward the tips of the antennae. And finally, I am informed by Dr. Creighton that females of the genus *Myrmelachista* he has seen look much like those of *Iridomyrmex* in general appearance (despite the difference in subfamily allocation), which would make those species decidedly unlike the *cooperi* female.[1]

Wheeler gives the distribution of *Aphomomyrmex* as Ethiopian and *Myrmelachista* as Neotropical, but this is no proof the former could not occur in the New World tropics, especially as the fauna of that region is far from exhaustively studied. Moreover, Menozzi (1935) described a Neotropical *Aphomomyrmex* nearly twenty years ago, so it is not unknown from this side of the Atlantic. And the genus which Dr. Brown proposes, *Neaphomus*, has been regarded as a subgenus of *Aphomomyrmex*.

In view of the above discussion, therefore, and *particularly* since we are as yet unable to associate the worker caste with the female of the species concerned, I submit the following correction, and the synonymy then should read:

Aphomomyrmex (Neaphomus) cooperi (Gregg), new combination for *Camponotus* (*Myrmostenus*) *cooperi* Gregg, 1951, *loc. cit.*

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1935. Le Formiche del Cile. Zool. Jahrb. Syst., 67:319-336.

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[1] In contrast, Dr. Brown believes, "there is no essential difference in the clavation of the antennae between *cooperi* and certain *Decamera* species. In fact, *cooperi* may be said to have stronger and more definite clavation of the funiculi than does *M.* (*D.*) *paderewskii* female. Furthermore, certain species of *Myrmelachista* (eg. *M. skwarrae*) are smaller replicas of *N. goetschi* in all essential habitus characters, including the lengthened head. Thus, while to Creighton some *Myrmelachista* females may look like *Iridomyrmex* of the same caste . . ., at least some have an appearance very much different from that of *Iridomyrmex*."

FURTHER NOTES ON NORTH AMERICAN *EPICAUTA*, WITH NEW SYNONYMY (COLEOP., MELOIDAE)

By F. G. Werner
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The availability of series of several of our species of *Epicauta* has made possible a more thorough study of the species involved than has been possible before. Some of the more extensive necessary changes are recorded in this paper. Several of the series have been sent for determination and are acknowledged under the species. Most of the rest were collected by Dr. and Mrs. W. L. Nutting and the author during the summers of 1948[1] and 1949.

Epicauta emarginata Champ.

Epicauta emarginata Champion, 1892, Biol. Cent.-Am., Coleop. *4* (2) :426, pl. 19, fig. 24. Vaurie, 1950, American Museum Novitates No. 1477: 30.

Epicauta calcarata Werner, 1944, Psyche *50* (1943): 70; 1945, Bull. M. C. Z. *95*: 477. (New Synonymy)

A long series of this species (over 150 specimens) was collected by the author 15 miles west of Lordsburg, New Mexico, Aug. 30, 1949, on flowers of a grass. Most of the specimens fit the description of *calcarata*. Some have broader and some have narrower tibial spurs than the holotype of that species. Two abnormally small individuals (7 mm.) have sparser pubescence and more slender legs and tibial spurs. The color of the pubescence varies from cinereous to dull yellow-cinereous, being cinereous in most.

Two paratypes of *emarginata* Champ., kindly loaned by Mr. J. Balfour-Browne of the British Museum, agree perfectly with some specimens in the Lordsburg series, and differ from the holotype of *calcarata* only in having slightly more slender posterior tibial spurs. The shape and size of the anterior and middle tibial spurs are precisely the same as in the type of *calcarata*. The two species are certainly the same.

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[1] This trip, for the purpose of collecting and studying Anthicidae, was made possible by a grant-in-aid from the Society of the Sigma Xi.

The known range of *emarginata* is now from San Isidro[2] in Coahuila to west Texas and southeastern Arizona. I have the following additional records: TEXAS: Marathon, July 9, 1938 (K. U.); Culbertson Co., Aug. 30, 1947, D. J. and J. N. Knull (Ohio). NEW MEXICO: Luna Co., Oct. 1 (Ohio). ARIZONA: Douglas, Cochise Co., July 3, 1931, W. W. Jones (Parker); near Willcox, Cochise Co., Sept. 3, F. H. Parker, on flowers of *Kallstroemia* (Parker); Dragoon Mts., Cochise Co., Sept. 10, 1947, D. J. and J. N. Knull (Ohio and Werner).

Epicauta ochrea (Lec.)

Lytta ochrea LeConte, 1853, Proc. Acad. Nat. Sci. Phil. *6*:342.

Epicauta ochrea, Werner, 1945, Bull. M. C. Z. *95*: 495, pl. 6, fig. 42. (See for rest of synonymy)

Epicauta moniliformis Dillon, 1950, Ent. News *61*: 103. (NEW SYNONYMY)

Ochrea is probably one of the more abundant species of *Epicauta* in the area from west Texas to southeastern Arizona, but is nevertheless very poorly represented in collections. The reasons it is rarely collected would seem to be twofold: first, that most collectors don't know where to look for it, and second, that most collectors who do know don't care to. Specimens can be taken at the bases of leaves of yucca or bear grass (*Nolina*) almost any time during the summer. One encounter with the leaves of either plant is usually enough. Occasional individuals are seen in the daytime on flowers of yucca. One experience with the species on yucca flowers at night convinces me that it is primarily nocturnal, though not "attracted" to light. On July 29, 1948 we camped on the west slope of the Patagonia Mts., east of Nogales, Arizona, at 5330 ft. in the oak-juniper zone. On checking a small stand of a caulescent yucca shortly after dark, we found one plant in full bloom, with a swarm of *ochrea* on the blossoms, feeding on the petals and mating. We knocked down and captured several hundred specimens, losing at least twice that many in the process. They took flight readily. This night one *ochrea* came to our lighted sheet nearby, the only one I have ever seen at light.

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[2] The only San Isidro I can find in Coahuila in the "Atlas Geographico de los Estados Unidos Mexicanos", Mexico, 1943, is near the Laguna de Viesca in the southern part of the state, on the Plateau Central.

The series taken at this time should provide a fair sample of the species. In it are small and large specimens, as is usual in almost any large sample of Meloidae. All mixed together, and with numerous cross-matings, are entirely ferrugineous to very dark specimens in which the elytra are ferrugineous. I have noticed this variation in color several times in the field.

Mr. Dillon has separated *moniliformis* on the basis of length of antennal scape, color, and width of body. Two eutopotypical specimens in the Chamberlain Collection are in the same size range as the two *moniliformis* types (9 and 11 mm.). The smaller specimen, a female, is colored as in Dillon's types; the larger, a male, is uniformly ferrugineous. The lengths of the antennal scapes compare with the *moniliformis* description, except that in the male the scape might be just perceptibly longer.

The body form, color, and length of antennal scape can be matched in my series from the Patagonia Mts. In the same series are entirely ferrugineous specimens in coitu with dark, *moniliformis*-colored specimens. There seems to be a tendency for the antennal scape to be slightly shorter in the smaller specimens. In about a third of the specimens under 12 mm. long the scape of the male antenna just reaches the hind margin of the eye; in the rest it extends beyond slightly. The measurement is a difficult one to make accurately and it often varies with the position or amount of extension of the antennae. I can see no difference in width of body in this long series or in the rest of the specimens in my collection. Apparent difference can be traced to amount of shrinkage of dried specimens, chance overlap of the elytra or amount of distension of the abdomen.

My Patagonia Mts. series shows a considerable size range, from 7 to 18 mm., with a mean length of about 14 mm.

Dark specimens are more frequent among the smaller specimens but occur also among the larger.

It is my opinion that Mr. Dillon has relied too heavily on exact measurement of variable characters in distinguishing *moniliformis*. One of the difficulties of taxonomic work with the Meloidae is the rather large amount of variation in size and correlated variation in proportions, or in expression of secondary sexual characters.

Epicauta fallax Horn

Epicauta fallax Horn, 1885, Trans. Am. Ent. Soc. *12*: 111. Werner, 1945, Bull. M. C. Z. *95*: 450.

Epicauta ensiformis Werner, 1944, Psyche *50* (1943): 68; 1945, *op. cit.*:462. (NEW SYNONYMY)

Dr. J. W. MacSwain has sent a series of *fallax*, from Patterson, Stanislaus Co., California, taken May 13 to June 4, 1948, by sweeping alfalfa. This series provides a much better sample of the species than was available in 1945. On rechecking the small series from Independence, California that was used in my 1945 paper I find that all of the specimens are females. The only information I had on the male was a set of notes on the type in the Horn collection. The male differs from the female mainly in the antennae, which are long and almost ensiform. The following description of the male antennae, taken from a Patterson specimen, should be added to my earlier description. Antennae 2 1/3 as long as an anterior tibia, reaching basal fourth of elytra. Segment I moderately slender, reaching 1/3 across the eye; II small, moderately stout; III 1 1/2 as long as I and 1/8 wider at apex, slightly curved toward the posterior; IV to VII subequal in length and breadth, about 3/4 as long as III; VIII to X equal in length, about 9/10 as long as VII, decreasing gradually in width so that X is about 3/4 as wide as V. Proportions[3] of antennal segments (to a

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[3] These measurements are used in an effort to provide a reasonably exact record of proportions of the individual segments. Segment I is given first. The numerators represent length, the denominators maximum width. The original measurements were made with an ocular micrometer in a stereoscopic microscope, and are accurate to ca. ±0.02 mm. For length of a segment a measurement was taken from the construction at the base, after the condyle, to the apex. The figures obtained were converted to

total length of antenna of 1000 units): 89/38, 43/33, 124/47, 92/49, 94/54, 91/50, 91/49, 82/49, 89/48, 86/43, 118/38. Segment V is the widest and the antenna tapers gradually toward the apex, segments III to X being slightly flattened and obliquely truncated at the apex. The most characteristic feature is the presence of very short, appressed, dark hairs on the underside of segments III to XI. These are directed perpendicularly to the axis and point to the midline of the antenna from each side. They can be seen only with fair magnification and proper illumination. At low magnification the surface of the underside of the antenna appears glabrous and roughened; the upperside has moderately dense, suberect pubescence.

The presence of these appressed hairs on the underside of the male antenna distinguishes this species from all others in our fauna, except *E. ensiformis*. On re-checking the type specimens I feel that *ensiformis* is based on characters that can be extremely unsafe, the absolute length of the antennae and the width of the segments. The ratio of the lengths of antennal segments seems to provide a reasonably reliable criterion for species separation. But there is no difference in this ratio in the two. In *ensiformis* there seems to be mainly an exaggeration of the width and a very slight exaggeration of the length of the intermediate segments, to produce an ensiform antenna from the antenna of a normal *fallax* male. The types of *ensiformis* are like the *fallax* series in all other details. From experience with other species of *Epicauta* I am inclined to regard *ensiformis* as a synonym of *fallax* and fully expect that more extensive series will show a gradation between the two.

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what they would be if the total antennal length, made up of the total of the individual lengths, were 10 mm. and the figures represented 0.01 mm. The total of the lengths as given is 1000 ± 3, the error resulting from rounding off anything under 0.01 mm. It is hoped that this system of recording measurements will prove superior to a segment-by-segment comparison, where errors accumulate as one progresses. It is also hoped that the antennae of different species will be more easily compared, since all would be converted to a standard 10 mm. length. The figures must not be taken as entirely diagnostic, however. They are to be considered as representing the antennae of a single "typical" specimen.

Epicauta diversipubescens Mayd.

Epicauta diversipubescens Maydell, 1934, Trans. Am. Ent. Soc. *60*: 333. Werner, 1945, Bull. M. C. Z. *95*: 487.

Mr. H. B. Leech of the California Academy of Sciences has pointed out to me that the Leng Collection of Meloidae contains three specimens bearing the locality labels of Maydell's first three specimens and that each bears a red "TYPE" label, probably put on by Maydell. I find from my notes that the specimen in the U. S. N. M. which I had thought to be the holotype in 1945 was without locality label. This evidence supports Mr. Leech's contention that I saw one of the paratypes and that the holotype is now in the California Academy. This specimen seems to be a male, from Mr. Leech's description, and is further distinguished by the lack of all but the two basal segments of the left antenna and in having a hole eaten out of one side of the abdomen.

Epicauta jimenezi Dugès

Epicauta jimenezi Dugès, 1889, Anales del Museo Michoacano *2*: 73. Champion, 1892, Biol. Cent.-Am., Coleop. *4* (2) : 417. Vaurie, 1950, American Museum Novitates No. 1477:23.

Epicauta nigropilosa Maydell, 1934, Trans. Am. Ent. Soc. *60*: 332. (New Synonymy)

Maydell seems to have been misled by Dugès' description of this insect, which was black, with the "Elitros grandes, de forma normal, granulosos y pubescentes, ferruginoso-oscuro con bonitos reflejos color de purpura." A specimen in the Instituto de Biologia, Mexico, D. F., is labeled *jimenezi* E. Dugès and bears a pin label "Guadalajara". This is almost certainly one of Dugès' type specimens. Maydell's type specimen, one of a series well distributed in collections, is certainly a specimen of *jimenezi*, one of the most distinct of the genus in Mexico. The "purple" reflections on the elytra are equally well seen in the *jimenezi* type or in *nigropilosa* eutopotypes, the color being produced by sparse black pubescence over rufo-testaceous background, much as the rufous pubescence over a black background produces the "purple" of *purpurea.*

The species is discussed here because certain specimens from southern Arizona appear to be assignable to it. These specimens from Arizona do not agree completely with a series from Guadalajara, differing mainly in the color of the elytra. The species is redescribed on the basis of a male specimen from Guadalajara; following the redescription a comparison is made with the Arizona specimens.

Black, the elytra rufo-testaceous, but with short black pubescence that darkens the color. Length 22 mm.; width across base of elytra 6.5 mm. Head subquadrate, as broad as long to apex of clypeus; surface densely punctured except along a narrow midline, opaque because of deep microreticulation. Antennal calluses not evident, being marked only by the slightly sparser, irregular punctures. Pubescence moderately dense but short, black, decumbent except along the lateral margins, where it is erect and longer. Eyes moderately narrow, 0.45 as broad as long, not very prominent. Antennae slender, 2.7 as long as an anterior tibia, 12 mm. long. Segment I moderately slender, reaching 2/3 across the eye, almost parallel-sided; II short; III and following slender, slightly flattened, all but XI slightly wider at apex than at base. Proportions of segments (to total length of 1000 units): 108/42, 51/29, 128/33, 101/37, 93/37, 93/35, 93/33, 88/33, 79/30, 75/29, 93/27. Maxillary palpi of male slightly enlarged and flattened, glabrous beneath; labial palpi just perceptibly enlarged, also glabrous beneath.

Pronotum subquadrate, just perceptibly broader than long. Surface densely punctured, with microreticulation as on head, and with short, subdecumbent to erect pubescence. Median impressed line distinct on middle of disc; median area depressed toward base. Scutellum black. Elytra rufo-testaceous, more shallowly and sparsely punctured than the pronotum but equally opaque. Pubescence black, short, decumbent, moderately sparse but giving a darker tinge to the color of the elytra. Anterior tibial spurs slender, straight in both sexes. Male anterior tarsi with a dense flat pad, broadened particularly on the first segment, decreasing gradually in width to segment 4. The pad of segment 1 of the male is 1.9 as long as in a female of comparable size, and 1.7 as wide. In the female the pad is not as dense or as flat as in the male and is of almost uniform width on segments 1 to 4. Posterior tibial spurs slender, sticklike, the outer shorter. Underside entirely black.

The three Arizona specimens before me are 18, 20 and 21 mm. long and are of the same proportions as the Guadalajara specimens. They differ only in having the elytra dark chocolate brown, made to appear almost black by the black pubescence. Three specimens from Champion's series are also available, through the courtesy of Mr. J. Balfour-Browne of the British Museum. Two are from Canelas and one from Ventanas, in Durango. These, and one specimen collected by myself in Tepic, Nayarit, have the elytral color intermediate between the Guadalajara and the Arizona specimens. For this reason I believe it would be preferable to postulate a North-South cline in elytral color, rather than subspecific relationship.

The species in our fauna that Arizona *jimenezi* specimens most closely resemble is *corvina* (Lec.). They differ in being opaque rather than slightly shiny and in having the elytra a bit narrower. The greater opacity is caused by the denser punctures and particularly by the deeper microreticulation. The middle and hind tibiae of *jimenezi* males are almost straight, as in the female, while in *corvina* males they are slightly flattened, broader and more bowed than in the female. The anterior tarsal pads of the male of *corvina* are denser, broader and flatter than in the female but the pad on segment 1 is shorter than in the male of *jimenezi*, being only about 1.5 as long as in the female of its own species. The two species are otherwise so similar that they must be very closely related. Arizona specimens will key to *corvina* in my 1945 key but can be distinguished by the characters given above.

Type locality: Guadalajara, Jalisco, MEXICO. (of *nigropilosa* Mayd.: same locality, Aug. 17, 1903, McClendon).

Additional records: MEXICO: 1, Tepic, Nayarit, July 22, 1952, F. W. & F. G. Werner, on flowers of a Composite (FW); Ventanas, Durango, Forrer; and Canelas, Durrango, Becker (BMNH). ARIZONA: 1 male, Patagonia, July 4, 1929, F. W. Nunenmacher Coll. (CNHM); 1 female, W. slope of Patagonia Mts. on Lochiel Road, St. Cruz Co., 5330 ft. in oak-juniper zone, July 28, 1948, W.

L. Nutting & F. G. Werner (FW); 1 female, Tumacacori Mts., July 22, 1940, D. J. & J. N. Knull (Parker).

Epicauta languida (Horn)

Macrobasis languida Horn, 1895, Proc. Calif. Acad. Sci. (2) *5*: 252.

Epicauta languida, Werner, 1945, Bull. M. C. Z. *95*: 424, 501.

The California Academy of Sciences has a small series of this species, as well as the holotype. Below is a short redescription, based on notes taken on the holotype (No. 154), seen in 1946, and checked at that time with the more recent specimens. The species should be left in my group A, in which the male does not have a row of stout apical teeth on the metatibia, and should be placed near *excors* and *tenuilineata*.

Color luteous, with the antennae brown. Pubescence tannish cinereous, depressed. Elytra with humeral and scutellar dark markings. Head narrowly ovate, the surface densely punctured, with the intervals punctulate. Median impressed line fine, distinct down to the level of the hind margin of the eyes. Antennal calluses denuded, smooth, of moderate size and only slightly raised. Eyes transverse, moderately narrow, emarginate. Male antennae 3 1/2 as long as an anterior tibia. Segment I flat, straight, reaching almost to occiput; II almost as long as I, flattened, slightly curved; III short, 1/3 as long as II, 2/3 as long as IV; IV the largest of the succeeding segments, rest just slightly shorter, slender, slightly flattened. Female antennae with segment I reaching hind margin of the eye; II almost as long as I; III approximately 1/2 as long as II; IV and following equal, almost as long as II. Pronotum campanuliform, 1/4 longer than broad; median impressed line distinct from 1/4 from base to 1/3 from apex; a prominent impression at middle of base. Anterior tibiae of male with two spurs, the inner slightly the shorter; male anterior tarsi not modified. Posterior tibial spurs spiniform, only very slightly broadened. Underside not marked. Legs marked as in *polingi* Werner.

Distribution: BAJA CALIFORNIA: Beside the holotype from San José del Cabo there are specimens in the California

Academy of Sciences collected by Michelbacher and Ross, from 10 mi. N.W. of LaPaz, Oct. 6, 1941; Arroyo Seco, Oct. 6; San Venancio, Oct. 8; and Agua Caliente, Cape Region, Oct. 18. It is thus far known only from the southern part of the peninsula.

NEW ENGLAND RECORDS OF ULULODES CURRIE (NEUROPTERA: ASCALAPHIDAE). — There are few records of the two indigenous species of *Ululodes* from the northeastern corner of the United States. The genus is not mentioned in Procter's Biological Survey of the Mount Desert Region [Maine], Part VII, 1946, nor is it recorded by Johnson in his Insects of Nantucket, 1930, or by Britton in the Check-List of the Insects of Connecticut, 1920 and 1938. There is only one citation in Leonard's List of the Insects of New York, 1926; and this is of *U. quadripunctata* from Staten Island, in the extreme southeast. Records of both species are more plentiful in Smith's Insects of New Jersey, 1910, and Brimley's Insects of North Carolina, 1938; the former work citing two localities for *U. hyalina* and five for *U. quadripunctata*, and the latter, four and two localities for these species, respectively.

Inasmuch as they represent extensions of the known ranges of both species, the following records from the author's collections are presented herewith, even though lacking such desirable data as precise locality and year of collection: *Ululodes hyalina* Latr., Marthas Vineyard, Massachusetts, 19 July, 1 specimen at light. *Ululodes quadripunctata* Burm., Marthas Vineyard, Mass., 2 August, 1 specimen at light; New London, Connecticut, July-August, 1948, 1 specimen. In all cases, poor condition precludes determination of sex of these specimens. The author will gratefully receive any records or specimens of *Ululodes* from the northeastern United States. — George H. Beatty, III, Plumsteadville, Pennsylvania.

A NEW NEOTROPICAL *CHRYSOPS* (DIPTERA, TABANIDAE)[1]

By L. L. Pechuman
Lockport, New York

The writer has realized for some time that the *Chrysops uruguayensis* discussed by Kröber (1926) was not the species described by Lutz under that name. However, he did not wish to add to the already overburdened synonomy of Neotropical *Chrysops* and as long as the identity of two of Brethes' species was unknown, there was danger of this. Dr. Walter H. Hack of the Instituto de Medicina Regional, Resistencia, Argentina, has kindly furnished the writer with descriptions of the Brethes species and both of them seem to be distinct from the species described below.

Chrysops patricia n. sp.

Holotype female. Length 8 mm.

Head: First two antennal segments yellow-brown with black hairs; third antennal segment yellow-brown at base, flagellum black; third antennal segment subequal in length to total length of the first two segments. Frons yellow-gray pollinose with pale hairs; dark brown pollinose in ocellar area with dark hair. Frontal callus large, brown, margined above with black. Frontoclypeus shining dark yellow with a narrow yellow-gray pollinose stripe extending from beneath the antennae about half the length of the frontoclypeus. Cheeks densely grayish-yellow pollinose with a denuded area below on each side which is mottled yellow and black. Palpi yellow-brown, paler on inner surfaces. Proboscis black. *Thorax*: Dorsum dark brown with two narrow pale stripes and a broader stripe on each side above the wing base. Scutellum reddish brown with a faint dark horizontal stripe near base. Pleura brown with the usual yellowish pollinose areas. Halteres brown. Legs slender, mostly dark brown with a reddish tinge which is especially evident on the fore coxae and middle tibiae; middle and

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[1] Published with a grant from the Museum of Comparative Zoölogy at Harvard College.

hind tarsi reddish brown, becoming darker at apex. Wings as figured; membrane very clear; the outer margin of the crossband is straight to the third longitudinal vein where it cuts back toward the base of the wing and then again runs straight to the fourth posterior cell where it stops short of the wing margin; the fourth posterior cell is slightly more than half infuscated; the fifth posterior cell is mostly hyaline with a small infuscated area at the base; the inner margin of the crossband reaches the posterior margin of the wing only as a narrow streak along both sides of the vein separating the fifth posterior and anal cells; apical spot narrow, the same width as the marginal cell, extending into the upper corner of the second submarginal cell over about one-fifth of the upper branch of the third longitudinal vein. *Abdomen*: Abdomen dark brown with pale grayish yellow markings. First tergite dark brown with a pale posterior border which expands laterally reaching the anterior margin of the segment and leaving an isolated dark brown spot on the posterior margin at the lateral margin of the segment; second tergite with large pale lateral spots which are the full width of the tergite at the lateral margins and gradually narrow toward the center and do not quite meet along the anterior margin of the tergite, and with a pale posterior border which expands into a large mid-dorsal triangle which reaches the anterior margin, and on each side of the mid-dorsal triangle the pale border expands to form a small flat triangle; third to sixth tergites dark brown with pale posterior borders which on the third and fourth tergites expand into small mid-dorsal

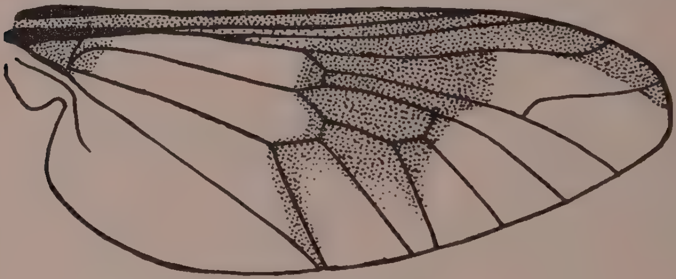

Fig. 1. *Chrysops patricia* Pechuman n. sp. Wing.

triangles. First sternite dull yellow with some vague dark markings; second sternite dull yellow with a faint indication of a dark central spot; third sternite dull yellow with a large median spot; fourth and following sternites fuscous with a yellow posterior border.

Cerro Pelado, Paraguay (F. Schade), M. C. Z. No. 29080. *Paratypes*: 1 female with same data as holotype; 1 female, Villarrica, Paraguay (F. Schade); 1 female, Aregua, Paraguay, 29 September 1915 (Zurcher); 1 female, Tucumán, Argentina, October; 1 female, Gran Guardia, Territory of Formosa, Argentina, October, 1952 (J. Foerster). Another female from Villarrica was studied, but since it is in poor condition and differs in several particulars from the rest of the material, it is not included in the paratype series.

Holotype and two paratypes No. 29080, in the Museum of Comparative Zoology, Cambridge, Massachusetts; three paratypes in the collection of the writer.

Variations: The series of specimens varies in length from 7 to 9 mm. The pollinose stripe on the frontoclypeus varies from a little longer to a little shorter than in the holotype. Some of the specimens show some indefinite dark streaks on the frontoclypeus and slight darkening around the frontoclypeal pits. The denuded area on the lower portion of the cheeks varies in size, and in color, from yellow to black. In two specimens the two pale stripes on the dorsum of the thorax broaden anteriorly until they meet. In one specimen the dark marking of the second tergite is reduced so that the pale lateral triangles reach across the dark marking leaving leaving two dark spots near the posterior-lateral margins of the tergite. In one specimen the pale median triangle of the second tergite does not reach entirely across the segment although its upper portion is indicated by a paling of the dark marking in that area.

Comparative Notes: *C. patricia* seems to be the species discussed by Kröber (Konowia *4*: p. 358, 1926) as *uruguayensis*. Kröber, however, mentioned that his interpretation of *uruguayensis* differed from Lutz' description of the wing pattern of the type. In some undetermined material at the United States National Museum, made available through the kindness of Dr. Alan Stone, the writer several years ago found a specimen from Buenos Aires, Argentina, which closely matches Lutz' description and figure of *uruguayensis*. Three other specimens recently received also match Lutz' species. These were collected by Juan Foerster on February 15, 1953 at Isla Berna in the delta of the Paraná River near Tigre, Province of Buenos Aires, Argentina. *C. patricia* is easily separated from *uruguayensis* Lutz by the hyaline apical portion of the fourth posterior cell, uniformly narrow apical spot united for almost its full width with the crossband (apical spot expanded apically and just barely united with the crossband in *uruguayensis*) and by the outer margin of the crossband which is relatively straight below the third longitudinal vein and somewhat irregular in *uruguayensis*.

Kröber thought what he considered to be *uruguayensis* might be the same as *bonariensis* Brethes but on a basis of Hack's recent paper (1951) they must be quite different. The species redescribed by Hack, who had access to Brethes' type, is either the same or closely related to *C. trifaria* Macquart.

Some of the specimens of *C. patricia* received from the Museum of Comparative Zoology, through the cooperation of Dr. J. C. Bequaert, were labeled *paraguayensis* Brethes. Dr. Hack kindly sent a redescription of the type of *C. paraguayensis* to the writer and this indicates that this species lacks an apical spot and the crossband is straight from the costa to the posterior margin of the wing. *C. paraguayensis* evidently is closely related to *C. formosa* Kröber and may be the same although the known range of the two forms is rather widely separated.

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THREE NEW SPECIES OF PANORPIDAE (MECOPTERA)

BY FUNG YING CHENG
Harvard University and University of Taiwan

The new species of Mecoptera described below have come to my attention during a study of Old World Panorpidae.

Genus *Panorpa*

Panorpa chiensis, n. sp.

(Pl. 5, figs. 1-3; text-fig. 1,A)

Body mostly black; vertex and rostrum uniformly shining black; thorax black dorsally, reddish brown laterally; the 1st-9th abdominal segments of male shining black dorsally and ventrally; the hind process of the third tergite is short and stout, unusually broad, with more or less truncate apex, and is in contact with the very short conical median projection of the fourth tergite; the 6th-8th segments not prolonged. Fore wing: length, 17.2-19 mm.; width, 4.7-5.2 mm.; membrane hyaline, markings brownish black; pterostigma not very prominent. Hind wing: length 15.5-17 mm.; width, 4.5-5.1 mm. ♂ genitalia: genital bulb slender; coxopodites long, their inner margins bearing a rounded process distally and a sharp tooth-like process medianly; harpagones slender, the outer margin greatly concave near the base, inner margin with a triangular process and a true basal lobe, which bears a tuft of bristles; the apex of harpagones usually truncate; hypandrium broad basally; branches of hypovalvae broad distally, its distal outer margins fold upward to form a triangular plate on the edge, the apex folded upward to form a rounded distal end, which reaches to the base of the harpagones; parameres simple, each consisting of a simple stalk, which broadens distally with a somewhat twisted apical portion, its distal inner margin usually bearing a row of short barbs; preëpiproct narrow towards apex, with very small U-shaped distal incision; aedeagus with prominent finger-like ventral processes, apical processes finger-shaped, lateral processes very short, sharp tooth-like, extended upward.

♀ unknown.

Holotype (♂): Chi-i, Korea; July 5, 1940; in the Museum of the Institute of Zoology, Academia Sinica, Shanghai.

Paratypes: Same collecting data as holotype: 1 ♂, in the above Institute of Zoology; 1 ♂, in the Museum of Comparative Zoology; 1 ♂, in Cheng Collection.

At first sight this species looks like *Panorpa approximata* Esben-Peterson, but the peculiar shape of the genitalia in the male easily separates the two species.

Genus *Neopanorpa*

Neopanorpa baviensis, n. sp.

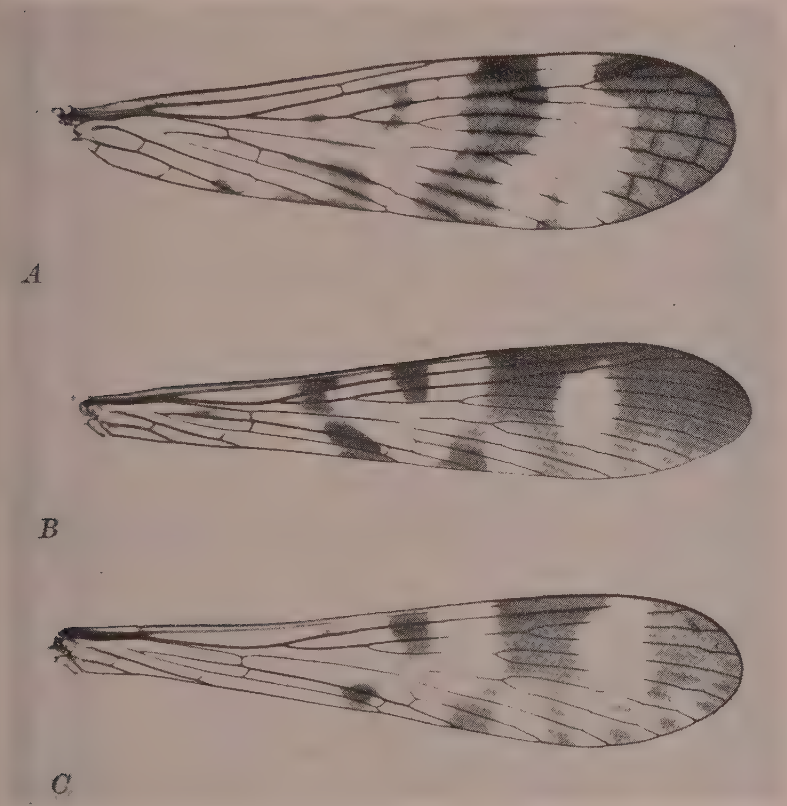
(Pl. 5, figs. 6-8; text-fig. 1,B)

Body grayish brown, vertex grayish brown posteriorly, black anteriorly; rostrum brown, with grayish brown longitudinal stripe on each side; thorax brown, meso- and metanotum with grayish brown median streak; the 1st-9th abdominal segments of male grayish brown dorsally and ventrally, median process of 3rd tergite short, extending a little beyond the middle of the 4th tergite. Fore wing: length, 15.5 mm.; width, 3.2 mm., membrane slightly brown, markings blackish brown; pterostigmal band broad, complete, with broad basal branch and apical branch; basal band complete; apical band very large, connected with the pterostigmal band at both the front and hind margins; basal spot obscure; marginal spot present; pterostigma not very prominent. Hind wing: length, 15 mm.; width, 3.1 mm., similar to fore wings, except that the basal band is indicated only by a spot at the hind margin. ♂ genitalia: genital bulb slender; coxopodites long with truncated apex; harpagones slender, the outer margin slightly concave at the middle, with a row of short black hairs at the middle; inner margin with a slightly projecting median portion and a small basal lobe which bears a small tooth-like process on its dorsal edge; hypandrium long; branches of hypovalvae slender, the basal portions wide apart, the distal portions, slightly overlapping each other; the apex of hypovalvae usually reaching to the middle of the harpagones; parameres simple, small and curved; preëpiproct slightly enlarged distally and with truncated apex; aedeagus small, with a pair of tooth-like processes on its dorsal edge, the apical processes united, lateral processes tooth-like, usually bent upwards.

♀ unknown.

Holotype (♂): Mt. Bavi 800-1000 m., Tonkin; July, 1941; A. DeCooman; in Heude Museum, Shanghai.

Paratype: 1 ♂; same collecting data as holotype, in Cheng Collection.



Text-fig. 1. A, *Panorpa chiensis*, n. sp., fore wing. B, *Neopanorpa baviensis*, n. sp., fore wing. C, *Neopanorpa contracta*, n. sp., fore wing.

This species differs from other described *Neopanorpa* by its rather sharp wing apex and the very long branches of the hypovalvae in the male.

Neopanorpa contracta, n. sp.
(Pl. 5, figs. 4-5; text-fig. 1,C)

Body mostly brown; vertex sooty brown, rostrum uniformly grayish brown; thorax deep brown dorsally; the 1st-7th abdominal segments of female deep brown dorsally, last few abdominal segments light brown. Fore wing: length, 14.5 mm.; width, 3.2 mm.; membrane hyaline, markings grayish brown; pterostigmal band complete, with a broad basal branch and apical branch; basal band represented by a spot; apical band large with two hyaline spots; basal spot absent; marginal spot large; pterostigma not very prominent; the basal portion of wing is very long and narrow. Hind wing: length, 13.2 mm.; width, 3 mm.; similar to the fore wing. ♀ genitalia: subgenital plate broad with wide V-shaped distal incision; internal skeleton small, the posterior arms of the plate rather long, twisted, with narrow apex, the axis shorter than the posterior arms, extending a little beyond the plate.

♂ unknown.

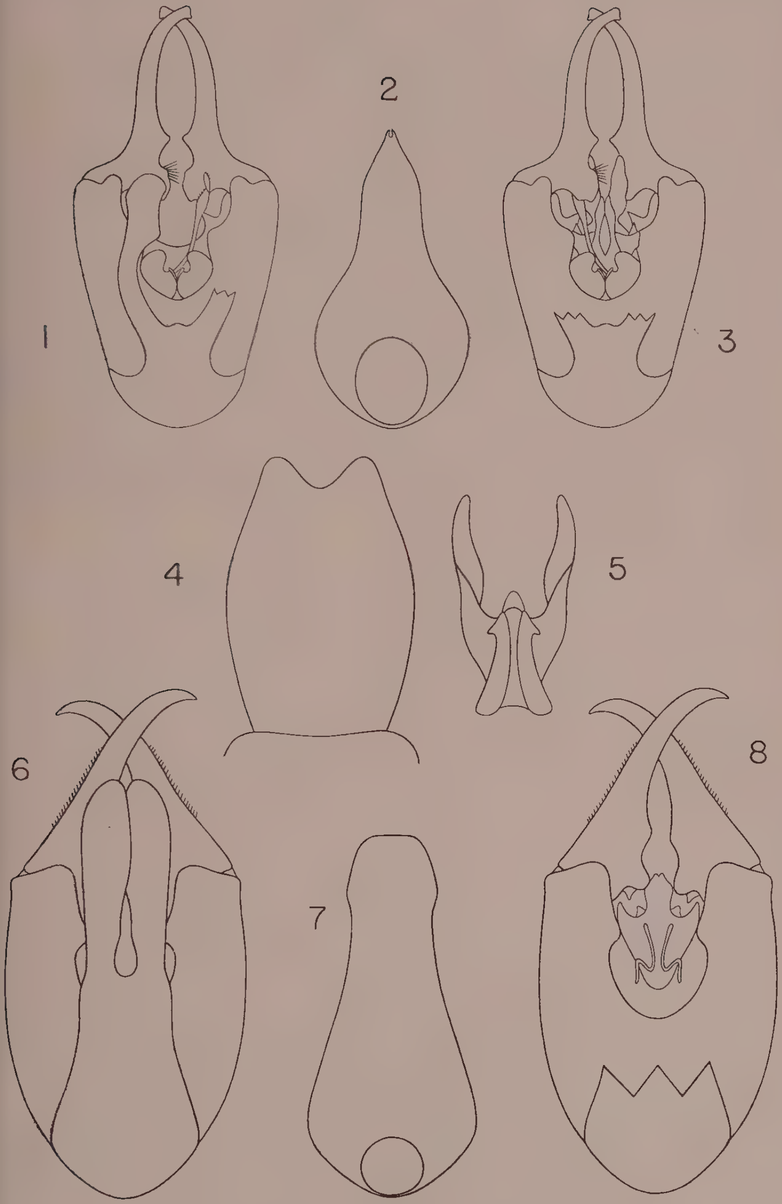
Holotype (♀): Darjeeling, India; May, 1938; Maa; in Maa Collection.

Paratype: 1 ♀; same collecting data as holotype; in Cheng Collection.

This species is easily distinguished from others of the genus by the very long and contracted basal portion of the wings. The shape of the female genitalia also makes its recognition easy.

EXPLANATION TO PLATE 5

Figs. 1-3. *Panorpa chiensis,* n. sp. 1, ventral view of genital bulb of ♂; 2, preëpiproct of ♂; 3, ventral view of genital bulb of ♂ with harpagones removed. Figs. 4-5. *Neopanorpa contracta,* n. sp. 4, subgenital plate of ♀; 5, internal skeleton of ♀. Figs. 6-8. *Neopanorpa baviensis,* n. sp. 6, ventral view of genital bulb of ♂; 7, preëpiproct of ♂; 8, genital bulb of ♂ with harpagones removed.



CHENG — NEW PANORPIDAE

LARVAL MITES OF THE GENUS *EUTROMBIDIUM* ATTACHED TO A CAROLINA LOCUST

BY W. W. JUDD
Department of Zoology
University of Western Ontario, London

A pinned female specimen of the Carolina Locust (*Dissosteira carolina* L.) captured at Bayfield, Ontario, July 25, 1924, and deposited in the collection of the University of Western Ontario, had a number of mites attached to the upper surface of the hind wings (Fig. 1 - L). Some of the mites were scraped off with a needle and were put in preservative and were identified by Dr. E. W. Baker, Bureau of Entomology and Plant Quarantine, Washington, D. C., as *Eutrombidium* (*trigonum* (Hermann) ?).

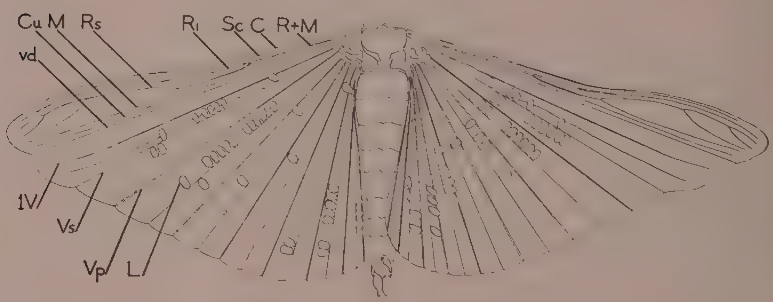


Fig. 1. Outspread hind wings of *Dissosteira carolina* L. to show attached larval mites (L). C — Costa, Cu — Cubitus, M — Media, Ri — First branch of Radius, Rs — Radial sector, R+M — Radius+Media, Sc — Subcosta, 1V — First Vannal vein, vd — vena dividens, Vp — primary vannal vein, Vs — secondary vannal vein.

There were 39 mites on the left wing and 40 on the right wing, on the upper surface, and a single mite was located on the lower surface of the left wing on a vannal vein near the hind border of the wing. They were attached to the veins by their anterior ends and were confined to the secondary veins of the vannal region (Fig. 1 - Vs). Snodgrass[1] shows that when the wings of the locust are folded the secondary vannal veins lie in troughs of the folds. Severin[2] says of the attachment of the mites that "on the adult grasshoppers, the favorite location is in the folds or plications of the hind wings." He records that on an adult female of *Dissosteira carolina* 175 mites were found attached to the body and appendages. On the specimen from Bayfield the mites were attached only to the hind wings. Some of the mites were softened in alcohol and when examined under the microscope proved to be six-legged larvae which resembled the figures of "active engorged" larvae shown by Severin (1944).

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[1] 1935. Principles of insect morphology. McGraw-Hill Book Co., New York.

[2] 1944. The grasshopper mite, *Eutrombidium trigonum* (Hermann), an important enemy of grasshoppers. South Dakota State College Agr. Exp. Sta. Bull. 3.

A GREGARINE, *DIPLOCYSTIS,* IN THE HAEMOCOELE OF THE ROACH, *BLABERUS CRANIIFER* BURM.

By W. L. Nutting

Biological Laboratories, Harvard University

Until such time as the genus of giant cockroaches, *Blaberus*, is better known, both taxonomically and biologically, it would be useless as well as impossible to present even a reliable list of their internal parasites. Furthermore, considering our meager knowledge of the protozoan faunas of some of our commonest roaches, the mere identification of forms in exotic roaches such as these, must often involve a certain amount of original research. However, since *B. craniifer* has gained considerable standing as a general laboratory animal in many institutions, attention should be called to a rather unusual acephaline gregarine, probably a *Diplocystis,* which has been noted in some cultures of this insect. Gregarines seem not to have caught and held the attentions of many protozoologists, but the encountering of such large, immobile bodies as *Diplocystis* during dissection of a cockroach, seldom fails to arouse the curiosity of the entomology student.

The stages of this gregarine most commonly seen are the paired trophozoites, and the cysts following the complete fusion of these pairs (fig. 1). Both stages are opaque white and smooth, and frequently attain a length or maximum diameter approaching 2 mm. Staining with haematoxylin reveals the nuclei and a coarsely granular cytoplasm in these otherwise almost characterless organisms. From one to 12 or more paired trophozoites or cysts may be found in the haemocoele among lobes of the fat body, generally near coils of the hind gut, but occasionally in the thorax. The early stages of *Diplocystis schneideri* Kunstler are found in the mid gut epithelium of *Periplaneta americana* until sufficiently developed to enter the host's body cavity. The cannibalistic tendencies of roaches insure the parasite's perpetuation through the ingestion of mature spore-containing cysts along with the tissues of weakened or dead infected individuals. This mode of infection probably explains why heavy infections in this gregarine are rare, even in crowded cultures of roaches, for crowding favors the growth of enormous infections of many gregarines whose cysts are passed with the feces.

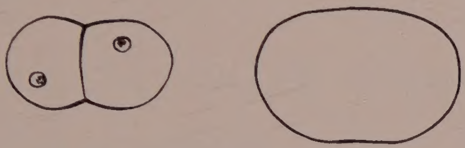

Fig. 1. Paired trophozoites (left) and early cyst of *Diplocystis* sp. from the haemocoele of *Blaberus craniifer*, X 13.

Since the mid gut and hind gut of *B. craniifer* harbor at least two cephaline gregarines, along with a number of other protozoans and nematodes, it is impossible at present to assess the effect of any one of them on the health of the roach. The presence of *D. schneideri* in *Periplaneta* raises doubts as to the specific identity of the *Diplocystis* in laboratory cultures of *Blaberus*. Large numbers of *Periplaneta*, raised adjacent to *Blaberus* cages, have been examined for the parasite with negative results. However, the identification of the *Diplocystis* in *Blaberus*, either as *schneideri* or as some other species, might involve carefully controlled and lengthy infection experiments. Although the life cycle of many gregarines is known, detailed information on their biology and host specificity is extremely limited.

It might be added that the gregarines most often observed by entomologists belong to the tribe Cephalina. These are commonly found in the alimentary canal of arthropods and other invertebrates. Some may accidentally reach the haemocoele, but only a few are regularly found there. On the other hand, members of the Acephalina are confined chiefly to the haemocoele and associated organs. Most of the known acephalines are found in annelids, but a few are known from echinoderms and insects. I wish to thank Dr. Victor Sprague of Black Mountain College, Black Mountain, N. C., for examining the gregarine fauna of *Blaberus*, and suggesting that this particular one might well be a *Diplocystis.* For a partial synopsis of this genus, reference should be made to the following paper which also contains a list of pertinent literature. (Semans, F. M. 1943. Protozoan parasites of the Orthoptera, with special reference to those of Ohio. Part IV: Ohio Jour. Sci., 43: 221-234, 271- 276.)

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